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RANGE IMPROVEMENT NOTES

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

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This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "NOTES" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

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PRELIMINARY REPORT ON BLACK GRASS BUG
LABOPS HESPERIUS Uhler

By
Dr. B. Austin Haws, Entomologist*

Many individuals and agencies have been involved at various times with problems related to the black grass bug and its damage to introduced and native range grasses. Participants will probably be interested to know that their combined efforts have resulted in the initiation of a research project supported primarily by funds from the Utah State University Experiment Station and the USDA/ARS. Individuals and agencies who have worked with the black grass bug in the past have recently contributed substantial support to the new project by providing maps, records, information, and other resources to help with some aspects of the present research project.

Representatives of State and Federal agencies who have been or are now involved directly or indirectly in the present black grass bug project include: Utah State University (Entomologists, Experiment Station, Extension Services, Range Sciences, Forestry, Wild Life, Cooperative Wildlife Research, Pathology, Plant Physiology, Soils, Irrigation, Animal Science, and Economics); National Weather Services; ARS/Grass Research; USDA/ARS/PPD; U. S. Forest Service and Experiment Station; Bureau of Land Management, Soil Conservation Services; Southern Utah State College; and Four Corners Committee.

As of September 1971, the USU Experiment Station established a Black Grass Bug Project and appointed Dr. B. Austin Haws as Project Leader. Later, the USDA/ARS granted USU $20,000 to help support these research activities. During August 1971, in connection with a Range Tour in southern Utah, representatives of many of the organizations listed met with ranchers, visited ranges, and discussed range grass losses and the grass bugs.

Samples of various native and introduced grasses in areas known to be infested by grass bugs were collected and established in greenhouses at USU in Logan in September 1971. Studies of the grasses and grass bugs have continued throughout the winter.

In March 1972, field research on grass bugs was initiated in areas surrounding Cedar City and Richfield. More extensive reports of this work will be distributed; but following is a brief summary of some of the research activities, observations, and results to date:

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*Professor of Entomology, Department of Zoology/Entomology - Utah State University, Logan, Utah.

1. Black grass bug males and females have been photographed and the distinguishing characteristics of the males and females identified. Eggs of the bugs have been found in grass stems at nearly all heights up and down the stem. They were deposited inside the stems and in the ends of old stems that had been broken off - also in the leaves. Limited numbers of black and white photographs and colored slides of the adults and their eggs have been distributed to a few individuals and agencies.

2. Small grass bug nymphs, (about 3/64ths inch - the same size as the eggs), and several larger stages of the grass bugs were observed in nearly all range grass areas of southern Utah, March 15-16, 1972. Some of the insects appeared to have been hatched and active long enough to have completed almost all stages of their development as nymphs, and a few were about ready to moult into the adult stage. An adult was found alive two weeks later, March 27. Areas where the nymphs were found had been under snow probably about a week before. It is not clear whether or not the insects had hatched and developed since the snows melted, (which seems unlikely), or if they had developed sometime previously in special microhabitats, such as warm exposures where development had been more rapid than in other areas.

3. Most grasses observed on March 15 had begun to develop and green growth was present. Some bug injury to the grass was present, but insect damage was difficult to distinguish from other discolored leaf areas that may have been yellow, due to other causes such as mites or frost.

4. During the week of March 27 near Alton, Utah, more than 200 grass bug nymphs were collected from one clump of grass less than one square foot in area. It was estimated that these 200 nymphs represented about one-fifth of those present in this same clump of grass. It is believed that there must have been between 800 and 1,000 nymphs in this area less than one square foot.

5. When grass bug nymphs were placed on single six-inch leaves of crested wheatgrass in the greenhouse, one nymph would almost completely destroy a leaf in about four hours. The exact nature of the injury is not known. The nymphs and adults feed by piercing the plant with a "beak." Present observations suggest that the grass bugs inject a substance into the leaves, presumably to facilitate the bug's feeding by histolyzing (disintegrating) some of the leaf structures. These feeding areas on the leaf soon turn yellow and seem to eventually spread and coalesce.

6. For unknown reasons, attempts to rear grass bugs from eggs, in order to study their biology and life history, have been only partially successful to date. Eggs collected in southern Utah in September 1971, and kept at room temperature several months did not hatch until they had been placed in cold temperature cabinets at 10^{o} C. (50^{o} F.) for a time. After

exposure to cold, one of these eggs hatched in seven days. Some nymphs brought to the labs from the field have not survived well. The reason for this lack of survival are being investigated. Reasons may include dessication and high temperatures in the rearing rooms, insecticidal contamination, changes of grasses utilized for feeding the nymphs, etc.

7. During March 28, 1972, when air temperatures were 22°F. grass bugs were observed to be very actively feeding on range grasses near Panguitch, Utah. Temperatures at that time in the grass crowns and soil surface were 47-52°F.

8. On April 8, 1972, adult black grass bugs were observed in range grasses located in warmer areas and lower elevations and smaller nymphs were seen in range grass at higher elevations. Some green range grasses that were observed to be heavily infested with grass bugs March 15, were completely yellow by April 8, indicating that under the conditions of this spring severe grass bug injury has occurred very early.

9. A small test has been initiated to determine the influence of grass bugs on the production of grass forage and on depletion of carbohydrates in the grass roots. Some grasses are being kept free from insect damage, while other grasses in the same fields are being exposed to natural insect infestations.

Present research plans include studies of grass bug taxonomy, biology, injury, economic losses, and control. It is hoped that studies of other influences on the insects and grasses can be included eventually; for example, weather, diseases, different methods of planting and managing range grasses, soils, wildlife, altitude, variations in moisture, etc. From time to time, brief progress reports will be sent to those interested. It is suggested that those who have opportunities to observe grass bug injury to grasses report their observations to their supervisors or to B. Austin Haws, Utah State University, Logan, Utah 84321, telephone 752-4100, extension 7849 or 7771.

During the summer various introduced and native grass ranges will be visited to try to determine the extent and seriousness of grass bug injury.

The cooperation of all who have and are participating in the grass bug project is appreciated.

Editor's Note: For additional information regarding the black grass bug see article by Frank Jensen in the January 1971 issue of Range Improvement Notes.

GRANGER-THYE ADMINISTRATIVE STUDY

Competition Between Fall Grazing by Cattle and Winter Grazing by Deer on Seeded Foothill Ranges

By
S. Ronald Lisonbee*

Game-livestock competition for browse on fall grazed ranges has been recognized from many studies and observations (Julander, 1965; Reppert, 1960; Smith & Doell, 1968). The usual pattern is for both classes to gradually increase their browse diet as winter approaches and understory forage dries and decreases in nutritive value. This trend is often accelerated by sudden changes in weather patterns such as a snowfall or a sharp drop in temperatures.

The Utah State Division of Wildlife Resources purchased several parcels of land between Holden and Kanosh, Utah, primarily for deer winter range. Eleven of these tracts were leased by the Fishlake National Forest under authority of the Granger-Thye Act.

By 1960, 8,870 acres had been reseeded and a management system for cattle devised. Most units were grazed from May 1 to June 26 and some were grazed October 1 to October 30.

After the grazing system had been established, competition between deer and cattle for bitterbrush and cliffrose was recognized, especially on the fall grazed units. This brought about a joint administrative study between the Forest Service and the Utah State Division of Wildlife Resources to evaluate grazing relationships between deer and cattle with regard to browse utilization.

A study plan was submitted by Dr. Odell Julander, who, at the time of the study, was with Intermountain Forest and Range Experiment Station, Forest Service, Provo, Utah. The Youngfield Granger-Thye pasture near Holden, Utah, was selected as the study area and studies were installed in the fall of 1966. The study was planned for three years but was terminated after two years.

Studies were established to determine competition between fall grazing by cattle and winter grazing by deer. To reduce competition, study criteria allowed 20 percent utilization of the browse by cattle.

The Youngfield pasture near Holden, Utah, contains 640 acres and is one mile square. Topography of the pasture is gently sloping to rolling foothills. Shallow draws run through the pasture in two places and hills are not over 100 feet high.

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*District Ranger, Ashley National Forest; Roosevelt, Utah. Summarized by Ladd E. Schiess, Range Conservationist, Fishlake N. F.; Fillmore, Utah.

Vegetative cover is excellent with both native and introduced grasses, and considerable amounts of native browse, principally bitterbrush (Purshia tridentata). Plant composition was determined by the hoop-weight site analysis technique, a standard survey method used by the Intermountain Region, USFS.

A. Sixteen utilization cages were placed throughout the area to provide ungrazed samples of vegetation which aided in utilization estimates. These cages were placed as follows:

Four in swales
Four on southwest slopes
Four on northwest slopes
Four on ridges.

Two cages of each set enclosed chiefly bitterbrush, the other two mainly grass.

B. Thirty-one bitterbrush branches were tagged near the cages and measured three times during the season.

1. Prior to use for the total ungrazed twig length.
2. After cattle use to determine utilization by livestock.
3. In spring to determine utilization by deer.

The spring measurement gave total use. Total use minus cattle use leaves deer use.

C. Sixteen line-plot transects (10 plots each, 1 chain apart) were established to determine the weight of forage by species and the utilization of each species. Studies were made prior to and following cattle use. One transect was located near each cage to sample the various aspects. The plot size was 9.6 square feet.

Camera points were also established at each cage.

On October 1, 1966, 130 head of cattle entered the study pasture. Cattle use on grass during the grazing period was relatively uniform throughout the pasture. Utilization varied from 10 to 33 percent with an average of 22% for the entire pasture.

The pasture was checked twice each week during the grazing period. Utilization studies were made on October 31. On that date it was determined that less than one percent of the bitterbrush had been used. Utilization studies made on November 7 still showed less than one percent use on the bitterbrush. On November 8 a snow fell and by the afternoon of November 9, use on bitterbrush reached 15 percent. Cattle were removed on November 12 with an average utilization of 16 percent on bitterbrush.

On May 2, 1967, twig measurements were made on bitterbrush to determine the amount of use by deer. The total use by deer and cattle on bitterbrush was 39 percent. Since cattle had used 16 percent before they were removed, this left 23 percent use by deer.

General view of the Youngfield Pasture - Note the gentle terrain and good stand of grass mixed with browse.

On October 1, 1967, 104 head of cattle entered the pasture. As in 1966 the use on grass was relatively uniform over the entire pasture. Utilization of the grass varied from 0 to 35 percent with an average of 19 percent over the entire pasture.

Checks were made twice each week to determine use on bitterbrush. On November 11, use was only one percent. On November 13 about 4 inches of snow fell on the area. Bitterbrush use averaged 19% by November 15 and cattle were removed.

On May 15, 1968, deer use was determined by twig measurements. Total use was 35.5 percent. Cattle had utilized 19 percent leaving 16.5 percent use by deer.

Summary and Conclusions

Crested wheat received the heaviest use of all understory forage. This is probably due in part to its ability to green up earlier in the fall than other grasses. When snow fell, cattle turned immediately from grass to bitterbrush. When it melted, cattle turned again to grass. These results were noted by other researchers (Julander, 1965; Smith and Doell, 1968; Reppert, 1960).

There was no significant difference in the utilization of browse on various aspects. This was probably due to the gentle, rolling topography of the area.

From this study it was determined that on important deer winter range, where there is a good understory of grass, cattle can be grazed in the fall with little competition between deer and cattle. However, as soon as snow falls, cattle will turn almost exclusively to feeding on bitterbrush. Therefore, where competition for browse cannot be tolerated, cattle can graze until the first snowfall then should be removed immediately.

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ALL AROUND IDAHO

Deer Need Natural Feed

By

Jim Humbird*

Farmers have known for generations that sometimes sick cows go off their feed. Because of the sickness, the rumen micro-organisms needed to carry the digestive processes are lost. Relief sometimes is found by robbing another animal of its cud and forcing it down the sick cow. The cud was, of course, rich in microbes of the kind needed to digest available feed and acted as a bacterial inoculation.

Because antelope, moose, bighorn sheep, mountain goat, deer and elk, like cattle and sheep, are ruminants, their digestive systems must be ready to handle whatever kinds of feed are available. Different kinds of micro-organisms are needed to break down various food plants. Most big game animals do not have enough of the right kinds of these microbes to digest plants. When offered hay or other artificial feeds during critical winter-time emergencies, many animals are in a weakened condition and die before they are able to build up a high enough population of microbes to digest alfalfa and other artificial feeds.

Rumen sampling on several different summer-winter ranges since about 1964 shows that deer have definite choices or preferences in what they eat, and it is now known that deer cannot exist for long on one food alone. For example, no one species of browse shrub is desirable - not even bitterbrush. The diet of these animals must contain a mixture of several different shrub species. Deer on winter ranges in Lemhi County live primarily on just two kinds of sagebrush, grass and forbs.

More sagebrush than bitterbrush was found in the stomachs of deer wintering on the Boise River, where good stands of bitterbrush are found. One shrub, whatever the species, will not completely satisfy all dietary needs of deer.

On poor winter range, deer take what's available to them, becoming more selective as varieties increase. They might prefer a shrub that is not there, but must choose on the basis of what is available. The existence of multiple browse species on a winter range is most desirable so that the animals can choose - cafeteria style - from a number of different items. Experiments in Colorado demonstrated that deer consumed more volume where they could get adequate mixed diets than they did where the selection was limited.

How this works is illustrated by food habits studies made on several different ranges the past few years. Rumen sample examination of deer collected in the Cassia Big Game Management Unit (54) showed that deer do use sagebrush to advantage when it is available on a winter range. Rumen sample analysis indicated that 44 percent of the mixed diet was sagebrush, 4 percent bitterbrush, 40 percent grass, 4 percent other shrubs, and 8 percent forbs.

*Idaho Fish and Game Department News.

Last winter, sampling on the Boise Front found a mixture of 41 percent sagebrush, 6 percent bitterbrush, 14 percent forbs, 30 percent grass, and 9 percent other shrubs.

A few deer are collected each month of the year on several ranges, both winter and summer, to determine the physical condition of the animals and what they have been eating. In addition to samples of rumen or stomach contents, ovaries, bone marrow, kidneys and teeth are taken. Game managers want to find common indices which will link animal health with feed types, reproduction and time of year. They want to know deer diets for each month of the year, and how this ties in with the physical condition of the animal.

Deer food habits analyses have been made on ranges in Hells Canyon, Lemhi, Cassia, Owyhee, Boise, Payette and the East Fork of the Salmon River, and a more general study on the Middle Fork of the Salmon River. In any case, managers of deer ranges across the southern half of the state are looking for assistance from plant species other than bitterbrush to carry the animals on winter ranges. The animals do well as long as their diets contain an adequate mixture of several different shrubs, grasses and forbs.

Sagebrush has a higher fat content and more digestible nutrients than any other species of browse shrub. Deer need a lot of both to give them energy and heat to sustain them through the cold months. The drawback inherent in sagebrush is that it contains a high percentage of volatile oils which, when eaten alone, inhibits the action of rumen bacteria. However, if sagebrush is mixed with other plant species, this effect is lessened.

Thus, it would be desirable to introduce sagebrush on deer winter ranges of the South Fork of the Payette River. It would be a supplemental forage species, since bitterbrush is predominant. If available, deer will select sagebrush in proportion to their needs even though bitterbrush may be their first choice. Such eating habits have been observed on other similar winter ranges.

In other words, a deer herd that has access to an adequate supply of natural feed is highly productive. A well fed, highly productive herd can produce more game hunting than a large herd of less productive deer. A program of annual harvests which keeps big game population within limits of their natural food supply during "average" or "normal" winters will allow some "cushion" to absorb greater use during especially severe winters which come periodically.

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Don't waste time looking BACK - Your eyes are in the FRONT of your head.

VARIOUS PLANT NUTRIENTS

The following information about the role of various plant nutrients has been excerpted from OUR LAND AND ITS CARE, a publication of the National Plant Food Institute, Washington, D. C. - 1962.*

MAJOR PLANT NUTRIENTS

1. Nitrogen:

Gives dark green color to plants.
Induces rapid growth.
Increases yields of leaf, fruit, or seed.
Improves quality of leaf crops.
Increases protein content of food and feed crops.
Feeds soil micro-organisms during their decomposition of low-nitrogen organic materials.

2. Phosphorus: :

Stimulates early root formation and growth.
Gives rapid and vigorous start to plants.
Hastens maturity.
Stimulates blooming and aids in seed formation.
Gives winter hardiness to fall-seeded grains and hay crops.
Is extremely important to germinating seedlings.

3. Potassium: :

Imparts increased vigor and disease resistance to plants.
Produces strong, stiff stalks, thus reduces lodging.
Increases plumpness of the grain and seed.
Essential to the formation and transfer of starches, sugars, and oils.
Imparts winter hardiness to legumes and other crops.

SECONDARY PLANT NUTRIENTS

1. Calcium:

Promotes early root formation and growth.
Improves general plant vigor and stiffness of straw.
Influences intake of other plant foods.
Neutralizes poisons produced in the plant.
Encourages grain and seed production.
Increases calcium content of food and feed crops.

*Range and Wildlife Digest - Northern Region, USFS - June 15, 1963.

2. Magnesium:

Is an essential part of chlorophyll, which gives the green color to leaves.
Is necessary for the formation of sugar from carbon dioxide and water in sunlight.
Regulates uptake of other plant foods.
Acts as carrier of phorphorus in the plant.
Promotes the formation of oils and fats.
Plays a part in the translocation of starch.

3. Sulphur:

Gives increased root growth.
Helps maintain dark green color.
Promotes nodule formation on legumes.
Stimulates seed production.
Encourages more vigorous plant growth.

HUNGER SIGNS IN PLANTS

Plants show hunger signs which can be detected by careful observation and study. While these signs are definite, in many cases considerable experience is necessary for their recognition and proper treatment.

A disadvantage of this method of diagnosis lies in the fact that it may reveal deficiencies too late for effective treatment of current crops. This information can be used, however, in preparing for the following season. Some common hunger signs are as follows:

1. Nitrogen Deficiency:

A sickly yellowish green color.
A distinctly slow and dwarfed growth.
Drying up of "firing" of leaves which starts at the bottom of the plant, proceeding upward. In plants like corn, grains and grasses, the firing starts at the tip of the bottom leaves and proceeds down the center or along the midrib.

2. Phosphorus Deficiency:

Purplish leaves, stems, and branches.
Slow growth and maturity.
Small slender stalk in case of corn. In small grains, lack of stooling.
Low yields of grain, fruit, and seed.

3. Potash Deficiency:

Mottling, spotting, streaking, or curling of leaves, starting on the lower levels.
Lower leaves scorched or burned on margins and tips. These dead areas may fall out, leaving ragged edges. In corn, grains, and grasses, firing starts at the tip of the leaf and proceeds down from the edge, usually leaving the midrib green.
Premature loss of leaves and small, knotty poorly-opened bolls on plants like cotton.
Plants, like corn, falling down prior to maturity due to poor root development.

4. Calcium Deficiency:

Young leaves in terminal bud become "hooked" in appearance and die back at the tips and along the margins.
Leaves have wrinkled appearance.
In some cases, young leaves remain folded.
Light green band along margin of leaves.
Short and much-branched roots.

5. Sulfur Deficiency:

Young leaves light green in color, have even lighter veins.
Short slender stalks.
Slow, stunted growth.
Spotting of leaves, as with potatoes.
Immature fruit, light green in color.

6. Magnesium Deficiency:

A general loss of green color which starts in the bottom leaves and later moves up the stalk. The veins of the leaf remain green. Cotton leaves often turn a purplish-red color between the green veins.
Weak stalks with long branched roots.
Definite and sharply defined series of yellowish-green, light yellow, or even white streaks throughout entire leaf as with corn.
Leaves curve upward along the margins.

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An unbiased person: Someone who has the same bias as we have.
COW COUNTRY - Oct. 1967.